MONTHLY LETTER OF THE BUREAU OF ENTOMOLOGY

UNITED STATES DEPARTMENT OF AGRICULTURE

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(Not for publication)

ANNOUNCEMENT TO BUREAU WORKERS

With this number of the Monthly Letter, which covers the activities for September and October, there has been a change in the method of assembling items to be included. It is hoped that unedited notes selected from material supplied by division leaders will serve better to familiarize workers with investigations carried on in other units and laboratories than did recent issues which consisted largely of excerpts from monthly reports. It is expected that notes assembled in this way will be more pointed and useful than the abstractly informatory notes included in the monthly reports. Acquaintance with others' problems should stimulate personal interest in the work of the Bureau as a whole. Items appearing in the Monthly Letter may suggest "leads" to the solution of your problems. The Monthly Letter is, however, not for publication or distribution to other than Bureau workers without specific approval. The urgent need for practical solutions of important insect problems cannot be overstressed, and we should avoid following up interesting side lines which have no direct bearing on assigned investigations.

Questions in regard to any of the items reported are welcome and will be answered in following issues if thought to be of interest to the Bureau as a whole; if of more limited interest, the answers will be by individual letters.

This is your news letter and with your cooperation it will be a truly representative house organ.

Lee A. Strong

A. A. A. ALLOTS MONEY FOR WORK ON TOBACCO-PRODUCT INSECTICIDES

In the hope of broadening the use of tobacco products in insecticides, thereby providing a means of disposing of additional quantities of the low-grade tobacco and thus aiding in the orderly marketing of this crop, the Agricultural Adjustment Administration has transferred to the Bureau $3,900. The funds transferred have been allotted to the Divisions of Fruit and Shade Tree Insects, Truck Crop and Garden Insects, Insects Affecting Man and Animals, and Physiology and Toxicology, and will remain available during the current fiscal year. This small allotment will permit the expansion of certain activities to include tests in determining the effectiveness of various nicotine compounds on certain insects for the control of which insecticides other than nicotine are now recommended.

FRUIT AND SHADE TREE INSECTS

Oriental fruit moth parasites imported from Japan.--H. W. Allen, in charge of the oriental fruit moth work at Moorestown, N. J., reports that the emergence of parasites from two large shipments of field-collected oriental fruit moth larvae from Japan was completed in August. The total number of larvae forwarded was 142,554 and from these 87,091 parasites emerged, a general parasitization of 12.6 percent of all emerged material. The parasitization of larvae from Chosen (Korea) was 36.5 percent as compared with 5.6 percent from Japan.

During August and September 9 species of imported parasites, the greater number being Phanerotoma grapholithae Mues., Dioctes molestae Uch., and Macrocentrus thoracicus Nees, were liberated in various eastern peach-growing sections.

Fruit moth bait-trapping results.--W. P. Yetter and L. F. Steiner, Cornelia, Ga., have summarized their season's work with bait traps for the control of the oriental fruit moth. Among the important developments of the past season has been a corroboration of previous results as to practical control. One orchard was baited for the purpose of demonstrating the value of the bait traps and in two other orchards a large proportion of the trees were baited in the course of experiments to determine the relative attractiveness of various materials. In these three orchards the oriental fruit moth infestation was 77.6, 46.4, and 77 percent, respectively, less than that in unbaited orchards some distance away. These orchards were smaller than the general areas baited in previous years. The outstanding bait used was terpenyl acetate 1/2 c c per trap in 10 percent medium soft sugar. These results as to practical control were corroborated by the recoveries of marked moths that had been released in the orchards. In two of the experimental orchards the recoveries of liberated moths were 73 and 64 percent, respectively. Dissection of the captured moths shows that comparatively few eggs had been laid before they were taken. Experiments with marked moths indicated again that after harvest a general movement of the moths occurs. A much smaller proportion of the moths were captured after the fruit had been removed from the orchard. It is believed that unless all orchards in an area are baited little or nothing would be accomplished by the continuance of trapping in individual orchards after harvest time.

Paradichlorobenzene-cottonseed oil emulsions effective and safe in control of borers in peach nursery stock.--Mention has previously been made of satisfactory results obtained by Oliver I. Snapp, in charge of the Fort Valley, Ga., laboratory, in the use of emulsions of cottonseed oil in which paradichlorobenzene has been dissolved, for the control of the peach borer (Aegeria exitiosa Say) in orchard trees of all ages. This work has now been extended to the control of peach borers in nursery stock, a matter of special interest, now that this insect has been accused of playing an important part in the transmission of the phoney disease of peach. Spraying the base of the trees with emulsions of crude cottonseed oil carrying 1/16 to 1/8 ounce of paradichlorobenzene for each tree has given perfect control of the borers and no injury to the trees. This treatment is comparatively inexpensive also, as the materials cost only about 0.2 cent per tree. Mineral oil used in the same way has given satisfactory control of borers but has caused a little injury; the cottonseed oil is therefore recommended as preferable. Emulsions of gasoline or kerosene in which the chemical had been dissolved caused serious injury to the nursery stock.

New Orleans laboratory moved to Wooster, Ohio.--The New Orleans field laboratory, which has been investigating the control of the camphor scale and certain other insects, has been closed and a part of the work transferred to Wooster, Ohio. In recent years the New Orleans laboratory has been devoting a great deal of its attention to a much-needed fundamental investigation of oil sprays. In order to broaden the field so as to include many of the problems relating to deciduous fruit trees, it was decided to transfer the work to a more northern point. At Wooster quarters are being furnished by the Ohio Agricultural Experiment Station. The space made available consists of a chemical laboratory, a biological laboratory, an office, and an inside insectary for breeding test insects during the winter season. The work is cooperative with the Bureau of Chemistry and Soils, and the program includes studies of mineral oils, pine oils, tar distillates, and the incorporation of added substances to increase the toxicity of oil sprays. A. W. Cressman continues in charge of this work for the Bureau of Entomology, and L. H. Dawsey for the Bureau of Chemistry and Soils.

JAPANESE AND ASIATIC BEETLES

Lateral migration of grubs of the Japanese beetle under field conditions.--According to I. M. Hawley, Moorestown, N. J., "Tests previously reported showed that under greenhouse conditions third-instar grubs of Popillia japonica Newm. would travel at least 7 feet in 37 days, both in fallow soil and in soil covered with a good stand of grass. During the past season experiments have been under way in which natural field conditions were provided by using large cages on the laboratory grounds. Two plots, each 24 feet square, were used, covered with 8-mesh screen. In one a good stand of grass was grown, while the other was left fallow. Late in September 500 healthy field-collected grubs were placed in a 3-foot circular area in the center of each plot. At the end of 31 days the soil in one fourth of each plot was examined to determine the posi-

tion of the grubs. Of 104 recovered in the grass plot, 1 had traveled 130 inches; 12, between 10 and 20 inches; and 52, less than 10 inches; while 39 were recovered in the part of the central area where the grubs were started. In the fallow cage 106 grubs were recovered, of which 1 had traveled between 40 and 50 inches; 4, between 30 and 40 inches; 7, between 20 and 30 inches; 26, between 10 and 20 inches; 32, less than 10 inches; and 36 were still in the central area where they were placed at the beginning of the test. In general, as in the greenhouse tests, the grubs moved greater distances in fallow ground than in sod. The grub that traveled 130 inches in sod must have been an unusually active one. The other three quarters of the two plots will be examined at varied intervals next spring."

Distribution and abundance.--H. Fox, Moorestown, reports that "At the end of the 1933 season the area of continuous infestation is estimated as 8,800 square miles (a provisional estimate of 8,600 square miles was reported for August). The area in square miles in the different States involved is as follows: New Jersey, 6,000; Pennsylvania, 2,120; Delaware, 560; Maryland, 50; and New York, 70. The records on soil population frequencies at a number of golf courses included in the periodic grub surveys, as given herewith, indicate that the infestation in eastern Pennsylvania seems to be somewhat more intense than in the adjoining sections of New Jersey."

Comparison of Soil Population Frequencies in Stations included in Periodic Series of Surveys, 1933

Stations	Date	Area Sq.Ft.	Population per Square Foot		
			Average	Minimum	Maximum
New Jersey					
Moorestown Golf Course	Oct. 2	152	3.1	0	20
Riverton " "	Oct. 2-11	224	1.4	0	35
Burlington Co. " "	Oct. 11	77	15.6	0	46
Woodbury " "	Oct. 10	150	2.4	0	24
Oak Valley " "	Oct. 10	130	1.6	0	32
Pitman " "	Oct. 9	213	5.1	0	33
Pine Valley " "	Oct. 19	148	1.5	0	24
Forest Gate " "	Oct. 27	150	10.6	0	49
Hopewell " "	Oct. 12	116	17.9	1	65
Pennsylvania					
Philmont Golf Course	Oct. 26	136	12.1	0	43
Ashbourne " "	Oct. 3	100	12.0	0	32
Cedarbrook " "	Oct. 3-4	142	11.5	0	38
Whitemarsh " "	Oct. 4-16	102	19.3	0	45
Marble Hall " "	Oct. 19	100	9.4	0	31
Plymouth Valley " "	Oct. 20	100	9.3	0	32
Doylestown " "	Nov. 1	100	11.5	0	28
Concordville " "	Oct. 6	52	5.0	0	31
Delaware					
Wilmington Mun. Course	Sept. 22	100	10.8	0	61
DuPont Golf Course	Oct. 6	50	4.2	0	17

Incidence of disease.--In connection with the grub surveys, records are made by H. Fox and T. N. Dobbins of all dead and obviously diseased larvae found. The following table gives the summarized record for September and October:

Percentage of Dead and Obviously Diseased Individual Larvae

Periods	Merchant-ville	Moores-town	Tavis-tock	Lippincott Pasture	Jenkin-town	Rydal	Phil-mont	Torres-dale	Gen'l Av.[1]
Sept. 1-15	0.2	0	3.4	0.8	0	0	1.7	0.7	1.1
16-30	3.7	1.0	1.9	1.1	1.4	2.3	3.5	2.5	2.2
Oct. 1-15	3.1	0.6	5.4	2.4	1.5	2.1	1.3	2.1	2.3
16-31	3.0	2.4	6.2	2.6	2.3	5.3	5.4	5.3	3.7

[1]Based on total number of cases, not the collective averages of all stations.

Control of the adult beetle by means of mechanical traps.--F. W. Metzger, Moorestown, submits a report covering the work with traps in the blueberry plantations at Whitesbog, N. J., during the past summer which is summarized as follows: In 1933 nearly 1,300,000 beetles were captured in 150 traps located around the blueberry field at Whitesbog, N. J. The heaviest infestation was located at Tranquillity field. The traps did not appear to attract beetles into the blueberry fields from any considerable distance. The infestation at Whitesbog was not greater than at several other locations in the pine barrens. The beetle caused no serious injury to fruit and damage to foliage was severe only in sections of Tranquillity and Union fields. The reason for the heavy infestation around Tranquillity field is not apparent. The work should be continued at this locality for several seasons in order to obtain comparative data regarding beetle abundance.

Treatment of evergreen and deciduous nursery stock in the field to prevent artificial dispersion of larvae.--W. E. Fleming and F. E. Baker, Moorestown, have completed the regular fall survey to determine grub infestation in the four plots containing a variety of stock commonly grown in commercial nurseries in this territory. These plots were laid out and treated in 1929, the plants contained in them having originally been planted as seedlings. Each spring the soil in the treated plots has been analyzed and enough lead arsenate added to restore the original concentration, following exactly in this respect the procedure required by the Bureau of Plant Quarantine of nurseries maintaining a certified status. Results of the surveys this fall indicated that apparently the treatments as applied are still completely effective in eliminating larvae from the soil of the treated plots. The results are given in the following table:

Plot No.	Lead arsenate per acre	Larvae per 100 sq. ft.
	Pounds	Number
1 - - - - -	0	75.5
2 - - - - -	1,000	0
3 - - - - -	1,500	0
4 - - - - -	2,000	0

Introduced parasites--Tiphia popilliavora.--M. H. Brunson, Moorestown, reports that in an effort to ascertain reasons for the failure of colonies to become established in the field, laboratory observations this year have been devoted primarily to the interrelation of the parasite and host and to the mating of the parasite. Evidence obtained in 1932 indicated that females collected early in August, the period in which adults appear in the field, were not fertilized, as the progeny of these females in the laboratory were largely males. In 1932 cocoons were obtained from females seen mating and females placed with males for 1 and 2 days, for comparison of their progeny in 1933. The grubs used in this work were, as much as possible, used no more than 1 day after being dug in the field. The results are as follows:

Source of cocoons in 1932	Cocoons	Adult emergence 1933		Cocoons yielding adults
	Number	Males	Females	Percent
Females seen mating. Host second and third instar grubs	678	241	194	64.1
Females with males for one day for mating. Host second instar grubs . . .	152	114	3	76.9
Females with males for one day for mating. Host third instar grubs . . .	577	131	269	69.2
Females with males for two days for mating. Host second and third instar grubs	454	150	155	67.1

The results obtained this year indicate not only that mating of females is necessary for the progeny to be part females, but that the number of females appearing in the progeny of mated females may be greatly influenced by the host. When second-instar grubs are parasitized, the progeny may be largely males, but the progeny from third-instar grubs will be about even males and females, or largely females. Observations this year revealed that unmated females mated, even after ovipositing for 9 days; that practically all, if not all, of the females collected in the field mated; and that females mate but once.

Emergency relief labor.--Labor has been furnished by the local relief administrator in connection with the Emergency Relief Administration for New Jersey to the extent of 238 man days during the month of October for grub-survey work at the Moorestown laboratory. During October at the Westbury, Long Island, laboratory 520 man hours of labor have been furnished by the Emergency Relief Administration for Asiatic garden beetle grub surveys in New York.

TRUCK CROP AND GARDEN INSECTS

Results with Rotenone Dusts and Sprays

Results on a number of tests which have been completed during September and October on the effectiveness of the rotenone compounds against a number of insects are now available. These results are distinctly preliminary and will possibly be much modified by additional work.

F. S. Chamberlin, of the Quincy, Fla., laboratory, reports that "during the present growing season a small field of tobacco, very heavily infested with the garden flea hopper (Halticus citri Ashm.) was dusted with derris. A few rows were treated with straight derris and the remainder with dilute material. Applications which totaled nine were continued through the greater part of the growing season. No appreciable control could be observed. A study of the relatively few serious infestations of this insect on tobacco showed that these invariably follow cultural practices favorable to the insect during the late fall and winter seasons. Favorable conditions consist of a rank growth of vegetation furnishing both food and shelter for the insect during the winter. These observations indicate that clean cultivation during the late fall furnishes the most satisfactory control remedy for this tobacco pest."

Mr. Chamberlin also reports that, of various dusts tested against the tobacco flea beetle (Epitrix parvula Fab.) derris dust produced the highest mortality within the shortest period of time. Derris caused an immediate and extreme irritation, as evidenced by the insects' convulsive effort following application of the material.

Reports from J. C. Chamberlin, Twin Falls, Idaho, indicate that preliminary tests show derris to have approximately the same effectiveness when used in oil against beet leafhoppers as has pyrethrum of similar concentration.

Norman Allen, Baton Rouge, La., reports that experiments in which a derris dust containing 1 percent rotenone was used "substantiate previous observations that rotenone in addition to killing the turnip aphid protects the turnip plants for several days from attack by chewing insects." Derris dust diluted with x-grade tobacco dust to 0.5 percent rotenone and derris dust diluted with ground electric sublimed sulphur to 0.5 percent rotenone protected plants from leaf-eating species from 6 to 8 days.

Various results are reported with derris on Murgantia histrionica in preliminary trials. J. U. Gilmore, Clarksville, Tenn., reports a field test in which derris dust was used, mixed half and half with tobacco dust, with entirely unsatisfactory control. G. E. Smith, in work at Baton Rouge, La., reports that "as a control for Murgantia histrionica, 1, 2, 3, and 4 percent rotenoneswere tested in cages in the field. The following respective kills were obtained within 144 hours: 71.4, 61.9, 90.4, and 95.2 percent. Because the kill obtained with the 2 percent dust was rather low it was replicated, giving a 94 percent kill in 144 hours.

L. W. Brannon, Norfolk, Va., reports that in cooperation with a grower a traction duster was used in an experiment in which several rotenone-content dusts were used against the harlequin bug. Very poor results were obtained with the traction duster, even though the nozzles were arranged in several different ways. Best results were obtained when heavy applications were made with a hand duster. Counts indicated that a commercial derris dust at the rate of 38 pounds per acre had a repellent action. Practically no kill was obtained with rotenone-content sprays 1-200 in an experiment made when the temperature was 68° F. and the relative humidity 76 percent. The same materials gave excellent results when the temperature was 83° F. and the relative humidity 84 percent.

W. J. Reid, at Charleston, S. C., reports that derris dust, mixed with tobacco dust to give a 1.5 percent rotenone content, is particularly effective against the melon worm (Diaphania hyalinata L.) and the pickle worm (Diaphania nitidalis Stoll). In a series of plots in which derris, cryolite, pyrethrum, paris green, lead arsenate, and calcium arsenate were used, effective control was obtained in the order given. The derris plot produced 765.5 pounds of sound fruit, as compared with 86.5 pounds of sound fruit produced on the calcium arsenate plot. The derris plot produced over 100 pounds more sound fruit than did the cryolite plot, which was next in effectiveness. The check plot produced no sound fruit.

J. U. Gilmore, Clarkesville, Tenn., as a result of a series of tests on tobacco for the control of the tobacco hornworm, states that neither pyrethrum nor derris, even at the heaviest doses, gave satisfactory hornworm control. It is worthy of mention, however, that hornworm larvae, after feeding on derris, stopped feeding for a period, even though they were not killed.

C. B. Wisecup, Sanford, Fla., reports that in the one feeding test conducted during October against the larvae of the southern armyworm, small and large larvae were introduced into cages with the following rotenone-containing dusts or sprays on sweet potato leaves:

Derris spray - 5 percent rotenone - 1 part in 200
Derris dust - 3 percent rotenone, 0.3 mg. per square inch
Proprietary cube extract - 1.6 percent rotenone - 1 part in 200
Proprietary cube dust - 0.57 percent rotenone, 0.3 mg. per square inch

The derris, with the greater rotenone content, appeared somewhat more repellent, showing less feeding at the end of 2 days, when all larvae were removed to fresh, untreated food. The end results after a week's time were disappointing, as no material had given a kill of over 33 percent. However, the derris gave consistently better kills, both as dust and spray, indicating that the rotenone content must be taken into account when recommending a derris or cube product.

In tests by Mr. Wisecup against the bean leaf roller leaves were treated in the laboratory and larvae introduced. The most consistent kill was given by synthetic cryolite, either as a spray or a dust diluted with flour. Sodium fluosilicate dust (30 percent) was very effective against the small larvae, as were the lead arsenate spray and the rotenone-containing dust. Against the large larvae rotenone-containing dusts and 30 percent sodium fluosilicate were much less effective than cryolite flour and lead arsenate-lime dusts. Rotenone-containing sprays, at 1 part in 200 parts of water, appeared to be rather effective repellents, as only a small portion of the treated food was eaten. However, when untreated food was added the larvae fed readily and developed normally, indicating that the contact with the rotenone-treated food had not been fatal.

Sweet potato Weevil Control

Through funds allotted by the Federal Emergency Relief Administration work is actively under way in eliminating seaside and marsh morning-glories in areas infested with the sweetpotato weevil in Alabama, Georgia, Mississippi, and Louisiana. This work is being done in cooperation with the States. R. L. Cockerham, in charge, reports that the labor obtained and the type of work being done are very satisfactory.

Beet Leafhopper Control in California

A similar project is under way in California where an attempt is being made under the direction of W. C. Cook to reduce the breeding areas of the beet leafhopper through the burning and destruction of Russian thistle at strategic points in the San Joaquin Valley. This work is being done with the Federal Emergency Relief funds in the various counties in which the important Russian thistle areas occur.

Mexican Bean Beetle Hibernation

After summarizing the past season's notes, J. R. Douglass, Estancia, New Mex., makes the following comments on the hibernation of the Mexican bean beetle:

"This season's investigations confirm the findings of the preceding season in eliminating the upper Sonoran and the Canadian life zones as potential hibernation quarters for the Mexican bean beetle in the Southwest. In the western yellow pine forest zone an average of 15.48 percent of the beetles introduced in the various cages overwintered. Successful hibernation of the bean beetle in the Estancia Valley is confined to the western yellow pine (Pinus ponderosa) association of the Transition Life Zone, especially where oak trees are associated. The pine belt is used to distinguish the zone of hibernation as the oaks go up into the fir-spruce association. The evidence at hand indicates that beetles can not hibernate above the Coloradan zone even if adequate hibernation material is available, but can do so below the Coloradan zone."

Sand Land Wireworm Control

J. N. Tenhet, Fairfax, S. C., states that the outstanding fact revealed by the past year's experimentation indicates that a "35 to 40 day period of clean cultivation in every instance resulted in 50 to 60 percent reduction in wireworm populations."

Arsenical Residues on Cabbage

Extensive experiments on substitutes for arsenicals in the control of cabbage worms have been started on the fall crop of cabbage at Chadbourn, N. C., Charleston, S. C., and Baton Rouge, La. Because of drought considerable difficulty has been experienced in obtaining a stand of cabbage. The hurricane which occurred off the coast of Charleston also caused considerable damage to experimental plantings of squash for pickle worm and melon worm control, as well as to the cabbage crop.

Experiments on Tobacco Insecticides

A surplus of low-grade tobacco now on hand has stimulated a renewed interest in tobacco as an insecticide. Large-scale field tests will be conducted at the Charleston laboratory during the coming winter and spring, with various tobacco products, in order to determine definitely whether these materials are of value in the protection of the cabbage crop from damage by various species of insects. J. R. Weedon has been transferred to Charleston, S. C., from the Norfolk, Va., laboratory to assist in carrying on this work.

Erroneous Report of Arsenical Residue Poisoning in California

R. E. Campbell of the Alhambra, Calif., laboratory, reports that "extensive newspaper publicity was given to a series of food-poisoning cases early in September. Although later investigations proved absolutely to the contrary, health officers and doctors announced that the poisoning was caused by arsenical deposits on vegetables. The wide publicity had a detrimental effect on the sale of vegetables and agricultural authorities took measures to prevent a recurrence. Five conferences were attended, at which all angles of the matter were gone into thoroughly and plans were drawn up to be presented to growers, growers' organizations, insecticide dealers, buyers, and shippers, so that insects on vegetables might be controlled and possibilities of arsenical residues avoided. These plans were primarily emergency measures to cover the present critical situation, but also included the idea that methods of insect control should be developed so as to avoid entirely the use of arsenicals or similar poisons on leafy vegetables. Several field meetings were attended where the information was given directly to the farmers.

Mole Cricket Control

C. F. Stahl, Sanford, Fla., reports that "there has been unusual interest and dissatisfaction in the mole cricket situation this fall. Probably the most important reasons for this special agitation are the generally poor condition of the seed beds, owing primarily to unfavorable weather conditions and blamed more than it should be to mole crickets; the acute financial stringency, which makes it extremely difficult for the farmers to finance control measures; and the shifting of the intensity of infestations so that many growers who have been caused very little inconvenience in the past are now being faced with the problem of controlling heavy infestations. Opinion in the district varies in regard to the population of mole crickets this season but probably the majority of the farmers consider that the infestation is heavier than ever before. In my opinion the population of crickets is not so great as it was 2 years ago, but is distributed over a much larger area, with a shifting of centers of very heavy infestation. Adults have been flying to lights in increasingly large numbers on favorable nights during the past month. The attraction of lights seems to be quite strong to the crickets moving from one location to another. This movement appears to be more a result of crowding and necessity for redistribution than anything else, and occurs during a short period in the early evening. Taking advantage of this habit may aid in our control program, and a study of the possibilities should be made. The most significant development in the feeding tests conducted during October has been the apparent effectiveness of sodium fluosilicate as a killing agent. Further indications of the repellent action of paris green have been obtained."

Tests with Two Brands of Magnesium Arsenate

L. W. Brannon, of the Norfolk, Va., laboratory, reports that "an experiment was conducted in order to determine the foliage tolerance of beans to two brands of magnesium arsenate. The results were as follows:

Insecticide	Injury by insecticide Percent
Chipman magnesium arsenate 1-50	70-85
Chipman magnesium arsenate 2-50	80-85
Dow magnesium arsenate 2-50	0
Chipman magnesium arsenate 1, lime 3-50	15-20
Chipman magnesium arsenate 2, lime 3-50	20-25
Dow magnesium arsenate 1, lime 3	0
Chipman magnesium arsenate 1, lime 3	15-20

The results show that the Chipman magnesium arsenate caused serious foliage injury at 1 and 2 pounds to 50 gallons of water and that the addition of lime considerably lessened the injury. As growers over the country have long been using the Dow magnesium arsenate as a spray without the necessity of adding lime to prevent injury, some of them might apply the Chipman magnesium arsenate without lime with serious consequences.

Study of Temperature Factor in Flooding for the Control of Wireworms (Limonius californicus Mann.)

E. W. Jones, Walla Walla, Wash., reports that "It has been observed in both field and laboratory studies that the submergence of wireworms in saturated soil has produced a consistently higher mortality than in water alone. As yet there is no physiological explanation of this insect behavior. A series of tests have been run at constant temperatures of 86°, 81.50°, 77°, 72.5°, and 65° F. Individual wireworms were placed in vials of soil and than water was poured over the soil until it was saturated. An inch of water was kept over the surface of the soil during the experiment. A number of groups of 20 wireworms each were held at the constant temperature for periods of 1 to 14 days. The results of these tests on soil submergence with wireworms at various temperatures are showing in the following table:

Period of submergence Days	Percentage of wireworms dead at 86°F.	81.5° F.	77° F.	72.5° F.	68° F.
3	95	95	50	35	5
4	100	95	75	55	25
5	100	100	90	65	40
6	100	100	95	75	55
7	100	100	100	85	75
11	--	--	--	100	100

As shown above, a 95 percent kill of wireworms was obtained at soil temperatures at 81.5° F. or above in soil flooded 3 days. A temperature of 77° F. was required to obtain 100 percent kill of wireworms submerged for a period of 7 days. At temperatures of 68° to 72.5° F. not over 85 percent mortality was obtained with wireworms submerged 1 week.

Mexican Mealybug Controlled by Treatment with Spray or with Fumigation

H. H. Richardson, Washington, D. C., in his work on the Mexican mealybug (Phenacoccus gossypii T. and Ckll.), which is becoming a serious pest of greenhouse chrysanthemums and many other ornamentals, reports that this pest can be controlled by spraying or fumigation with hydrocyanic acid gas. A 10 percent kerosene emulsion has resulted in a 100 percent kill of all stages except the egg. No injury has been observed where as many as four applications have been made at intervals of 4 to 9 days. Apparently this species differs from the other common mealybugs in being quite susceptible to hydrocyanic acid gas. A dosage as low as 1/8 ounce per 1,000 cubic feet of space with an overnight treatment in a tight fumigation chamber resulted in a very high kill of all stages except the egg. A shorter exposure for 2 hours to a higher dosage (1/4 ounce) was also effective. The several species of chrysanthemum used in tests thus far have shown good tolerance to these dosages of cyanide.

Hermiston Laboratory Closed

O. A. Hills is being transferred to Grand Junction, Colo., and the laboratory at Hermiston, Oreg., is being closed.

FOREST INSECTS

Black Hills beetle found missing on the Kaibab plateau.--J. M. Miller, in charge of the Berkeley, Calif., laboratory, reports:"One of the spectacular outbreaks of the Black Hills beetle (Dendroctonus ponderosae Hopk.) occurred just north of the Grand Canyon in Arizona during the period 1918 to 1925, but reports from the Park Service and Forest Service since that period indicated that the beetle had ceased to be a factor in the ponderosa pine forests of that region. These reports were recently verified by Ansel Hall, chief forester of the National Park Service, and the writer while making an examination of the North Rim forests of the Grand Canyon National Park, on October 30 to November 3, 1933. During the period of its epidemic outbreak the Black Hills beetle threatened to deplete the parklike stands of ponderosa pine which form the forest cover of the Grand Canyon National Park and the Kaibab National Forest. The infestation concentrated its attacks in local areas, killing tree groups so large that few living pines survived in some sections. F. P. Keen, who conducted surveys throughout these areas, estimated that the total loss from 1919 to 1925, inclusive, amounted to 511,000 trees, with a volume of 146,000,000 board feet. Control work was carried on against the epidemic centers from 1923 to 1925, and a total of about 50,000 trees were treated. Surveys conducted during the summer and fall of 1925 indicated that the epidemic was definitely on the wane, and in 1926 studies by M. W. Blackman established the fact that the infestation, though still present, had reached a light endemic condition which would probably continue. No surveys by the Bureau of Entomology have been conducted in the area since 1926; but the absence of any active infestation was reflected by correspondence and reports from Forest officers. During the summer of 1933 the Grand Canyon National Park undertook to treat all bark-beetle-infested pine trees within reach of the Citizens' Conservation Corps camp located near Bright Angel Point on the north rim. Altogether 71 trees were cut and peeled on an area of about 4,000 acres. These trees were all infested by species of Dendroctonus other than the Black Hills beetle, and no attacks occurred in groups. The infesting species were D. barberi, D. convexifrons, D. approximatus, and Ips spp., none of which have been found capable of developing aggressive epidemic infestations. On November 1 and 2 the writer covered about 2,500 acres by road strips, examining 46 trees that had been killed by bark beetles, but failed to find even one specimen of the Black Hills beetle."

Tree medication as a means of mountain pine beetle control.--J. C. Evenden,in charge of the Northern Rocky Mountain field laboratory, Coeur d'Alene, Idaho, reports: "Prior to 1933 experiments had demonstrated the feasibility of destroying broods of mountain pine beetle larvae in white pine through an injection of a solution of sodium arsenate within 50 or 60 days following attack. It was found, however, that in order to secure uniform brood mortality throughout the trees it was necessary to apply the poison to the entire circumference, which made the technic of application a difficult procedure. With the idea of testing different methods of applying this poison so as to secure satisfactory results as well as to determine the economic feasibility

of their use in an actual control project, where ordinary labor was employed, an experimental project was instituted on the Kaniksu National Forest. This project was started on September 11, and was closed the first of October, as after that date successful results could not be expected. A total of 25 men were employed, and though the project was badly handicapped by inclement weather, which prohibited all work on a number of days, approximately 500 infested trees were treated. Two methods which had previously given the best satisfaction, and which were based upon the same general principles, were tested. In order to apply the poison to the entire circumference of the tree, it was necessary to remove a narrow band of bark and to cut a shallow saw-kerf around the tree. A rubber band was then stretched over this kerf, and securely stapled in order to prevent leaks. The poisonous solution was then applied to the kerf through a spile attached with a rubber hose to a large container above. The other method was to tack a tin collar around the tree just below the saw-kerf. As these collars are shaped like the arc of a large circle, the flare produces a cup around the tree, into which the poisonous solution is poured. Of these two methods the tin collars were apparently easier to apply, and permitted a greater output per man-day. The final results of this project will not be ascertained until next spring, when the treated trees will be examined to determine the brood mortality. If successful, it is believed that the adoption of this method will greatly reduce the cost of controlling the mountain pine beetle in white pine, as the output per man-day can be increased by at least 250 percent."

Western pine beetle successfully controlled:--F. P. Keen, Portland, Oreg., reports: "Last year an epidemic of the western pine beetle sweeping through the ponderosa pine stands of central Oregon threatened to destroy the commercial value of large timber tracts. In three years' time on the Ochoco National Forest and adjacent private lands the beetles had killed an average of 10 percent of the stand and in some sections fully 50 percent of the timber was destroyed. The private timber owners and Forest Service joined forces and in the fall of 1932, with an expenditure of $31,000, covered 36,000 acres with an intensive control campaign in which some 16,000 infested trees were felled and burned. The results of this work were checked during October by surveying sample plots distributed through the area. It was found that the infestation on the treated areas had been reduced by 85 percent. Part of this reduction was due to the freezing of broods during the exceptionally cold winter of 1932-33, for on untreated areas a natural reduction of 48 percent was noted. However, the additional 37 percent reduction was evidently due to the effect of the control work. Moreover, much of the remaining infestation was composed of such weak broods that on 25,000 acres no further control work was recommended for this year."

Pine region checked for barkbeetle activity:--"With the help of field officers of the Forest Service and Indian Service," reports Mr. Keen, "78 320-acre plots distributed through the ponderosa pine forests of Oregon and Washington were recently surveyed to determine the damage done

by pine beetles and the trend of epidemic conditions. The survey showed that during 1932 barkbeetle activity exceeded anything previously recorded in the past 15 years, and was responsible for the destruction of nearly 2 billion board feet of ponderosa pine--timber which under normal market conditions would be worth $6,000,000. Much of this loss could have been prevented if control measures had been undertaken at the proper time. Owing to the freezing of beetle broods during the winter and the improved conditions of tree growth, the loss for 1933 will not exceed 50 percent of that for 1932, and some portions of the pine region are already back to what is usually considered a normal condition."

The insect population of ponderosa pine bark.--That the trunk of a single infested pine tree may harbor scores of insect species is one of the interesting sidelights of a caging experiment conducted by W. J. Buckhorn, Portland, Oreg., during the past season. Cages covering 2 square feet of pine bark on trees recently killed by the western pine beetle have yielded as many as 56 different species of insects, representing the following groups: Three primary species; 34 secondary species; 9 predacious species; 5 parasitic species; and 5 guests. Many of the species collected this season from the tree cages have never been reared before from the infested bark placed under artificial rearing conditions.

A general survey of the area near Fairfax, Va., infested by the southern pine beetle, made recently by F. C. Craighead and R. A. St. George, indicated that some 7,000,000 board feet of merchantable virgin shortleaf pine, as well as a considerable quantity of pulpwood, has been killed during the past two seasons by this bark beetle. This estimate is based on the company's survey of 1925 in which they reported 7,500,000 board feet of merchantable timber and 30,000 cords of pulpwood on the tract. Although some remaining pine is still being attacked it is felt that natural agencies have been sufficiently effective to largely curtail the activities of this beetle.

H. J. MacAloney, New Haven, Conn., reports a noticeable decrease in white pine weevil infestations both in natural stands and in plantations, due he believes to unfavorable conditions for hibernation last winter. This was learned from a study of permanent sample plots in New York, southern New Hampshire, central Massachusetts, and Connecticut. It is thus apparent that the control work by the removal of weeviled tips, conducted in Connecticut in the Emergency Conservation work was undertaken under the most favorable circumstances. Thorough work in the areas treated combined with the relatively small amount of infestation in surrounding areas should result in a still further decrease, and if continued for several seasons the stand should be greatly improved and the value of the final crop greatly enhanced.

R. C. Hall, Columbus, Ohio, reports that during the past field season certain representative sample plots were selected upon which to carry on a study of locust borer larvae survival. A careful count of young locust borer larvae was made on these plots early in the spring. A subsequent count of adult emergence was made on these same plots this fall. These two counts made it possible to determine the percentage of larvae surviving. Spring and fall diameter measurements were also taken on the above plots. About three fourths of these plots have been completed to date. From an analysis of these data it appears that a very close relationship exists between diameter increase and survival of locust borer larvae. This relationship is an inverse one with locust borer larvae survival decreasing as diameter growth increases. Trees with a diameter increase of greater than three tenths inch had practically no survival while those with an increase of less than one tenth inch had a very high survival of larvae, many of the latter having a survival as high as one Hundred percent. These data further strengthen the earlier findings that tree vigor and locust borer injury are very closely related.

C. W. Collins reports: "During the summer of 1933 the Melrose Highlands, Mass., laboratory, through the cooperation of the Bureau of Plant Quarantine, obtained gipsy moth larvae and pupae from the infestation discovered at Pittston, Pa., in 1932. These sample collections were placed in alcohol at the time they were made and have since been dissected for parasite records. The results are as follows:

Locality	Number dissected	Stage	Number parasitized
Jenkins	100	2nd and 3rd instar larvae	3 by Apanteles melanoscelus
Plains	100	2nd and 3rd instar larvae	2 by Apanteles melanoscelus 1 by Compsilura concinnata
Jenkins	76	4th and 5th instar larvae	4 by Apanteles melanoscelus
Plains	100	4th and 5th instar larvae	12 by Apanteles melanoscelus 36 by Compsilura concinnata
Jenkins	100	female pupae	12 by Sturmia scutellata

Previous collections had shown that the parasites mentioned above, as well as the predacious beetle Calosoma sycophanta, all of which were established in New England about 25 years ago, were present in the infested Pennsylvania area. Except for Compsilura concinnata, which attacks a large number of native insects and was known to have spread into Pennsylvania before the gipsy moth infestation was found, it is difficult to understand how these species established themselves in the Pennsylvania infestation.

During September and October shipments of parasites of a birch leaf-mining sawfly, Phyllotoma nemorata, were received at the Melrose Highlands, Mass., laboratory. This material was collected at Freistadt, Austria, and was forwarded by W. F. Sellers of the Budapest, Hungary, substation. For the most part, the adults of the various parasites contained in this material will not issue until next spring. Phyllotoma nemorata is a European species that has attracted considerable attention in northern New England and New York State during the past few years because of the injury it causes to white birch.

During the latter part of September and the first part of October, D. L. Parker, of the Melrose Highlands, Mass., station made examinations in 11 locations in New Hampshire, three in Maine, and one in Massachusetts, to ascertain the effectiveness of Apanteles solitarius which was first introduced from Europe by the station in 1927 and colonized as a satin moth parasite. The information obtained by Mr. Parker indicates that the species is this year responsible for a great reduction of the original fall population of the satin moth and there will be some additional parasitization of the survivors in the spring. Each small satin moth larva constructs an individual web in which to spend the winter. Out of a total of 3,011 hibernacula examined, 48.9 percent showed evidence that the larvashad been parasitized by the Apanteles, the parasitization ranging from 14.5 percent of 193 hibernacula noted at Yarmouth, Mass., to 66.7 percent for 306 hibernacula examined at Ossipee, N. H.

R. C. Brown, of the Melrose Highlands, Mass., laboratory, spent the period from October 2 to 18 in Maine laying out plots for further study of the beech scale. Thirty-seven plots of 50 beech trees each were laid out in that part of the State east of Augusta and extending to Calais. The majority of the plots are located where the scale is at present abundant but some are in territory where the insect has not yet been found and will serve as checks as the study progresses. All trees were tagged and examined and notes were made on their average diameter, condition, and crown class, as well as on the degree of infestation by the scale, the absence or presence of other insect enemies, the fungus Nectria, and slime flux; the two latter being often found on trees infested with the scale. Mr. Brown is conducting this work under the Emergency Conservation fund and while in Maine was accompanied by W. L. Baker, of this station, and T. T. Ayers, of the Bureau of Plant Industry. Dr. Ayers is studying the taxonomy of the genus Nectria and accompanied Messrs. Brown and Baker to make observations on it, other fungi, and slime flux in the plots.

CEREAL AND FORAGE INSECTS

Drought and low soil moisture apparently unfavorable to parasites of hessian fly:--Dissections of spring-generation puparia from various experimental sources in the area around Wichita, Kans., by J. R. Horton indicate that the drier the soil the smaller the population of hessian fly parasites. For example, the parasitization during October, based on examination of 800 puparia from an irrigated and from a nonirrigated wheat plot, averaged 21.5 percent in the watered plot but only 11.3 percent in the nonwatered wheat. The average of all the examinations in these 2 plots for the period July-October, inclusive, was 12.8 percent puparia parasitized in the irrigated wheat, as compared with only 6.1 percent in the nonirrigated wheat, or twice as much parasitization in the former. Again, a very high parasitization, 70 percent of the puparia, was found during October at the Riverside plot, where the soil is almost constantly high in moisture content; whereas at the Upland plot, where the soil is subject to rapid drainage, drought apparently had destroyed all the puparia, and no dissections of spring-generation puparia could be made. Dissections of fall-generation puparia, however, continued to favor the foregoing theory in that 1.5 percent puparia from the Riverside plot were parasitized; whereas there was no parasitization on the Upland plot.

Hybrid wheat selections show fly resistance regardless of scant fly population.--E. T. Jones, Wichita, Kans., states that notwithstanding the general low hessian fly infestation this fall, hybrid selections sown for fly resistance tests have disclosed a fair degree of resistance. He bolsters this statement up with a showing of results from October examinations of several fall-sown selections and their checks. These include 3 selections of Illini Chief X Blackhull F_6, Ziegler's Choice X Kanred F_5 and Kanred X Ziegler's Choice F_5, together with common seed Kanred checks. Based on examination of 2,100 culms from 21 plots, the results show infestations ranging only from 0.3 percent to 1.2 percent of culms in the various selections, whereas the average infestation of the checks is 3.8 percent.

Insecticide promising for reducing borer population in corn.--Mr. Horton states that an experiment undertaken at Tucumcari, N. Mex., to determine whether it is feasible to produce borer-free corn (check plots) for use in determining the amount of yield reduction caused by the southwestern corn borer (Diatraea grandiosella Dyar) gives promise of usefulness for this purpose. While these results are based on only a single application of barium fluosilicate (80 percent) for each generation of borer, and while the first (and most important) application was made too late to prevent considerable infestation, examinations of the corn in October indicate a considerable advantage from the insecticide and that much may be expected from its use, properly applied, to produce small plots relatively free from the borer. The insecticide was used as a spray in one series and as a dust in another series. The results were rated in percentage of stalks infested, borer population per 100 stalks, and percentage of stalks lodged by the borer. The sprayed corn was 56 plus or minus 2.4 percent

(standard error) infested with a population of 51.6 plus or minus 2.5 borers and 11.3 percent lodged; whereas the untreated corn was 76.4 plus or minus 0.9 percent infested with a population of 73.5 plus or minus 2.5 borers and 23.9 percent lodged--a difference of 19.9 percent infestation, 21.9 borers per 100 stalks, and 12.6 percent lodging in favor of the sprayed corn. The dusted corn was 52.4 plus or minus 2.5 percent infested, population 48.6 plus or minus 3.2 borers, and 14.3 percent stalks lodged, whereas the untreated checks for the dusted series were 77.7 plus or minus 2.3 percent infested, population 73.3 plus or minus 3.3 borers and 23.7 percent lodged--a difference in favor of dusting of 25.3 percent infestation, 24.7 borers per 100 stalks and 9.4 percent lodging.

Corn borer in squash.--A rather interesting case of infestation in squashes was investigated early in the month by B. E. Hodgson, S. O. Hill, and H. J. Cronin, Arlington, Mass. A report was received that the stems of squashes were being badly infested with corn borers and a visit to the farm concerned proved this report to be true. Dozens of the squashes had infested stems, sometimes 4 or 5 borers being found in a single stem. The borers were feeding in the soft outer part of the stems, none being found in the harder center or in the fruit. An examination of the field revealed considerable barnyard grass infested by the borers. It was evident that this grass was breaking down because of the cold weather and as a result of the work of the borers, thus causing the borers to abandon these quarters. The squash stems were the most readily available succulent food into which the borers could migrate. Subsequent examinations of the squash in storage revealed that the borers had abandoned the stems and that apparently none had entered, or in any way injured the fruit. This incident is rather interesting because very few observations have been made on the attack on squash by the corn borer. The few records we have indicate that when the borers are very abundant they sometimes feed in the leaf stems and the young tender fruit of this plant. (It is recalled that in the early years of corn borer investigations (1919-1922), borers were found entering the stems of mature squash, ready for market. In fact, quarantine action was contemplated at one time to insure the removal of the stems from such squashes. This was noted particularly in the Boston marketing district. Mr. Hodgson's observation corroborates the early occurrence of this phenomenon. D. J. Caffrey.)

Corn borer parasites.--W. A. Baker and assistants, Toledo, Ohio, report that Lydella grisescens Meig. continues to appear in practically all localities where it has been released. It is particularly evident in Lucas and Erie Counties, Ohio, and in Monroe County, Mich. Supporting information continues to indicate that this parasite may normally be expected to react most favorably to environments typical of the entire shore of Lake Erie.

Chelonus annulipes Wesm. became initially established in Lenawee County, Mich., following a release in that area of about 1,000 adults during the oviposition period of the host.

G. W. Barber, Savannah, Ga., spent the week of October 9-14, at Arlington Farm discussing plans for investigations of the corn ear worm (Heliothis obsoleta Fab.) the coming season. He reported that during the months of September and October, 1933, in Washington County, Ga., serious outbreaks of the velvetbean caterpillar (Anticarsia gemmatilis Hbn.) and Heliothis obsoleta practically destroyed hundreds of soybeans grown for seed, the plants being seriously injured during the same period by continuous dry weather.

A most interesting instance of the natural control of Heliothis obsoleta by Trichogramma minutum Riley was noticed in the case of a 100-acre soybean field. A vast flight of Heliothis moths was observed there on September 19, when, it is probable, moth population was at its height. As one walked down a row of beans a dozen or more moths were in flight at any given time, and tens of thousands were present in the field. Since no such concentration of these moths was observed at this time in any other bean fields it seemed possible that they were migratory individuals attracted by food afforded by the bean blossoms. These moths laid tremendous numbers of eggs on the bean plants, as many as three eggs on a single blossom and six on a single leaf were observed. Between September 19 and 28 a sufficient number of Heliothis eggs had been deposited in this field to result in its probable complete destruction, should the resulting young larvae survive. However, on September 28 the eggs were being destroyed in such large numbers by two natural enemies that control seemed likely to result. The bug Orius insidiosus Say was devouring eggs located principally on blossoms and stems, and the hymenopteron Trichogramma minutum was destroying eggs laid on leaves. A collection of 110 Heliothis eggs from bean leaves on September 28 showed the following fate; 92 percent parasitized by Trichogramma, 1 percent sucked by Orius, 1 percent died, and 6 percent hatched. At this time there were few Anticarsia moths in this field and the immediate danger of injury lay almost wholly in Heliothis as noted above.

By October 6, this field had been little injured, and such injury as had occurred was caused by a few Anticarsia larvae, the Heliothis caterpillars having almost disappeared. While Trichogramma, with the help of Orius, had thus afforded a practically complete control of Heliothis in this 100-acre field, and although Trichogramma attacked the Anticarsia eggs, it is difficult to explain the reason for control in this particular field, as other smaller and larger fields were largely or wholly destroyed by both Heliothis and Anticarsia larvae feeding in association, or by Anticarsia larvae alone. The most probable reason for this lack of general control was in great flights of Anticarsia moths into the area, which deposited eggs in such abundance that the parasite did not multiply fast enough to effect control.

As reported by A. F. Satterthwait, a cooperative project between S. C. Bruner, Chief of the Department of Fitopatologia y Entomologia of Santiago de las Vegas, Cuba, and the Webster Groves field station, Bureau of Entomology, looking to the introduction of 100 or more parasites of Horogenes electellum Hulst from the Missouri region to the sunflower fields of Cuba, developed during the summer beginning from correspondence during the winter concerning parasites. The ultimate plan decided upon was for the sunflower interests of Cuba to employ Ralph B. Swain, who

aided Dr. F. X. Williams in 1928 in the rearing of egg parasites, Anaphoidea calendrae, while the station staff worked out the life histories, as far as possible, of the parasites of this noxious webworm. A bewildering assortment of parasites was accumulated, including among the flies Tortriciophaga tortricis Coq., Leskiomima tenera Wied., Siphophyto floridensis Towns., and Lixophaga variabilis Coq., and among the hymenoptera, Angitia n. sp., Apanteles n. sp., Apanteles epinotiae Vier., Microbracon mellitor Say, Bassus buttricki Vier., Cremastus epagoges Cush., and Chelonus altitudinis Vier.

Extensions in wheat jointworm colonies:--As reported by T. R. Chamberlin, Forest Grove, Oreg., considerable spread of Harmolita tritici Fitch was found in the southern and southwestern parts of the Lebanon colony, the jointworm being found in one field 2 miles north of Coburg, Oreg., and approximately 7 miles south of the southernmost field in which it had previously been found. It was also found in one field on the Pacific Highway about 6 miles south of Junction City, and west of Coburg and the Willamette River. In our opinion the jointworm has existed in the region north of Coburg for some years and has spread rather slowly, but, owing to the widely scattered fields of wheat in the district, has been scarce, and we have consequently failed to pick it up in our previous surveys. It was not found in fields south and southwest of Junction City and probably reached the Highway 6 miles southeast of Junction City by spreading in a southwesterly direction from the fields north of Coburg. The jointworm was also picked up for the first time in fields along the Willamette River west of Cartney Station on the Oregon Electric Railroad. Since this pest has been within a few miles of these fields for some years, it was suspected of occurring there without actually being picked up. It was also found on Ingram Island in the Willamette River directly west of these fields.

In an effort to determine the reasons for the susceptibility of some varieties of sugarcane to the sugarcane borer (Diatraea saccharalis Fab.), T. E. Holloway and W. E. Haley, New Orleans, La., have been making a large number of tests to determine the hardness of the rind. It is believed that rind hardness is one factor influencing susceptibility or resistance. A special instrument is used, showing the pressure, in pounds, required to force a needle of a given size through the rind.

It has already been proved that soaking sugarcane in hot water will kill the sugarcane borer. J. W. Ingram, Houma, La., now finds that the treatment also kills the larvae, pupae, and adults of the small weevil Anacentrinus sp. Although first recorded from stubble, Mr. Ingram has recently found the larvae of this weevil in various parts of the stalk, even at the top. The cane should be soaked for 20 minutes in water heated to 50° C., 122° F., this treatment giving complete kill. The treatment would be advisable for seed cane to be shipped to the uninfested States of Florida and Georgia.

Chinch bug.--A survey of the affected area in northwestern Indiana was completed on Oct. 19 by Luginbill, Noble, and Painter, Lafayette, Ind. A total of 65 cornfields were examined in 18 counties. The bugs were abundant in 8 counties, but serious injury to corn was observed only in some fields in Lake County. In several cases oats next to corn were never cut, the poor crop probably being due partly to chinch bugs and partly to drought. While bugs were gradually leaving corn during October, periodic observations in a field near Otterbein, Ind., showed a rapid reduction of bugs between Oct. 27 and 30, coincident with the very warm, sunny weather. Evidently there was a sudden wholesale movement to hibernation.

COTTON INSECTS

Effects of hurricanes on cotton and cotton insects.--T. C. Barber, Brownsville, Tex., reports on the effects on cotton and cotton insects of the two hurricanes which swept the lower Rio Grande Valley of Texas on August 4 and September 4-5, 1933. About one third of the unpicked crop was ruined by the first storm, the estimated loss being 8,000 to 10,000 bales. The second and more severe hurricane of September 4-5 with wind velocity of more than 100 miles per hour brought the cotton season to an abrupt termination by defoliating the plants and demolishing 54 gins. All cotton was completely defoliated, many plants were killed by the wind loosening the root system, and some plants were actually wrenched from the ground. The wind combined with the effects of water from the accompanying 12 inches of rain killed most of the plants, only a few having since recovered and put out new growth.

The effect of the storms on the cotton insects seems to have been caused more by a shortage of food than by actual destruction of the insects. The cotton leaf worm moths were still plentiful during the early part of September, following the hurricane, but gradually decreased until they were seldom seen by the end of the month. Boll weevils were temporarily halted by the storm of August 4 but continued to be abundant enough to cause a heavy infestation of squares later in August. After the hurricane of September 4-5 all of the squares and bolls were stripped from the plants. Adult weevils were quite plentiful on the plants for the following week or two but had greatly diminished in numbers by the end of September. As the plants recuperated a few stunted squares and bolls were produced, some of which were examined for weevils. During October 252 fallen squares were collected but most of these had apparently fallen as a result of the general unhealthiness of the plants, as only 8 weevils emerged from them. This is in striking contrast to the usual heavy infestation found at this season of the year. The cotton flea hoppers practically disappeared after the last storm and are still very scarce. None have been taken on cotton since that time and, as most of the summer weed hosts were also destroyed, hoppers were not found in sweepings until the winter host weeds began to appear in October. Just what the final effects of these conditions will be on insect abundance next year is problematical. Normally the cotton stalks in this section are plowed under early in ths season and the land planted to winter truck crops. This year, however, with the destruction of the citrus and field crops, seed beds, and buildings, most of the farmers are confining their efforts mainly in restoring their property, and there is little prospect that the remaining cotton will be plowed under in the near future. If the winter is mild, breeding may continue and build up the insect population to about normal.

Cotton flea hopper.--K. P. Ewing and R. L. McGarr report that at Port Lavaca, Tex., by the end of October the seasonal activity of the cotton flea hopper had nearly ended. On the 12 migration flight screens in use only 177 flea hoppers were collected during October as compared with 1,117 in September, 1,409 in August, 6,125 in July, 3,826 in June, and 2,004 in May. Of the 177 caught in October, 131, or 74 percent, were caught during the first two weeks and during the last five days of the month only 5 flea hoppers were caught. Incidentally, the activity of other important cotton insects was indicated during October by the fact that 82 boll weevils and 65 cotton plant bugs (Adelphocoris rapidus Say) were taken from these screens. The gradually decreasing flea hopper population in October was also indicated by the counts made from 400 sweepings each week in croton fields. The average per 100 sweeps during the first week was 545; second week, 299.5; third week, 172.3; and fourth week, 92.5. On other plants in October 17.5 hoppers per hundred sweeps were taken on bitterweed, and they were taken in smaller numbers on cotton and Aster exilis, while no flea hoppers were taken on gum plant, elderweed, broomweed, and Erigeron canadensis. The cotton on which sweepings were made was young cotton that had sprouted and grown from mature cotton plowed under during the summer as part of the emergency cotton acreage reduction campaign. During September hoppers had been taken especially on Parthenium hysterophorus, bitterweed, and milkweed and in smaller numbers on bloodweed and ragweed.

All of the field plat control experiments for the season were completed during September and October. As a result of dusting with sulphur there was an average increase on 11 plats of 230.4 pounds of seed cotton per acre, or 33.6 percent, the range being from 411 to 88 pounds. The 4 plats dusted with sodium fluosilicate yielded an average increase of 191 pounds, or 13.9 percent, the range being from 196 to -46 pounds. The 6 plats dusted with a mixture of 75 percent calcium arsenate and 25 percent paris green (factory wet-mixed) yielded an average increase of 145.2 pounds or 23.8 percent, the range being from 304 to -4 pounds. One of the plats dusted with the mixture of 75 percent calcium arsenate and 25 percent paris green was severely injured by the bollworm. Excluding this plat, the other 5 plats dusted with this mixture yielded an average increase of 175 pounds, or 32.5 percent, the range being from 304 to 106 pounds.

The cage-emergence records this spring showed that each croton plant in this section overwintered an average of about 80 cotton flea hopper eggs, from which nymphs emerged. Every acre of croton contains several thousand plants, consequently, the 17,590 acres of croton in the county this fall will undoubtedly hatch millions upon millions of flea hopper nymphs next spring, a potential menace to the 1934 cotton crop.

The cotton leaf worm made its appearance early in the season in southern Texas, as is usually the case when it becomes abundant in other parts of the Cotton Belt in the late summer and fall. In July and August as it spread throughout parts of Texas many fields defoliated where arsenical poisons were not used. Not until September did it defoliate cotton fields in Oklahoma, Arkansas, Louisiana, and Mississippi. The leaf worm infestation in Texas is one of the heaviest ever recorded. Many fields as far west as the Big Bend section were defoliated and the worms were reported as appearing in Arizona cotton fields. Outside of the Cotton Belt the adult leaf worm moths were reported as injuring strawberries in Wisconsin on September 29 and as feeding on apple pulp and bruised apples in southwestern Missouri on October 2. At Port Lavaca, Tex., from 1,400 leaf worm eggs collected during September and early October 35 leaf worms hatched and 147 parasites emerged. From 1,000 leaf worm larvae collected during August and on September 1, 590 moths and 11 parasites were obtained, while from 500 larvae collected after September 14, 305 moths and 22 parasites were reared. There was also an increase in the number of parasites reared from leaf worm pupae collected in September as compared to those collected in August.

Effect of wind on pink bollworm.--It has been noted over a 13-year period that the total wind movement at Tlahualilo, Dgo., Mex., (Laguna District) during September seems to be correlated with the pink bollworm infestation in the El Paso Valley and other parts of the western cotton areas. It is pretty well established that the pink bollworm moths can be carried by the wind for long distances and then start oviposition. While definite proof of wind carriage is lacking, the heavier infestation in western cotton areas in years of greatest September wind movement in the Laguna, the infestations in isolated trap plantings, and the collection of pink bollworm moths in the upper air, all point to this conclusion. This September the total wind movement at Tlahualilo was greater than in 1928, 1929, or 1932, but smaller than in 1930 or 1931. F.A. Fenton's prediction, based on the wind movement, that the pink bollworm infestation in western Texas would be higher than in 1928, 1929, or 1932, has proved correct.

Insecticides tested on pink bollworm.--During the past season a large series of insecticides have been tested by F. A. Fenton, A. J. Chapman, and assistants, El Paso, Tex., in small field plots and in the laboratory for pink bollworm control. Calcium arsenate, copper arsenite, copper carbonate, barium fluosilicate, bordeaux mixture, and sulphur gave no larval control. Sodium fluosilicate, sodium fluoaluminate, derris, and rotenone all gave some degree of control. Derris was by far the most effective of all the insecticides used. In addition to preventing the young larvae from entering the bolls, derris was also a repellent and decreased oviposition on the dusted bolls.

Parasites of the pink bollworm.--L. W. Noble, H. B. Tittle, and J. M. Yeates report progress with the pink bollworm parasite investigations at Presidio, Tex. Two species, Microbracon brevicornis Wesm. and Exeristes roborator Fab., were obtained from the European corn borer laboratory at Monroe, Mich., because they had been reported as parasites of the pink bollworm in Egypt. During September two colonies of M. brevicornis each consisting of approximately 5,000 adults, approximately 40 percent of which were females, were released. From one point of liberation 7 specimens of Microbracon brevicornis were later obtained from pink bollworms. From the other point 31 M. brevicornis were obtained as well as 48 M. platynotae (Cush.) and 3 M. mellitor Say, two native parasites that appear to be adapting themselves to the pink bollworm. Some difficulty has been encountered in obtaining sufficient Exeristes roborator for liberation in the field. At first the parasites were bred on pink bollworms that had been killed by hot water, as at the Monroe, Mich., laboratory these insects were bred from European corn borers that had been killed in hot water. Of the first generation, after switching from the corn borer as a host to the pink bollworm, only 6.6 percent were females. Later better results were obtained by rearing Exeristes roborator on pink bollworms that had been paralyzed by Microbracon brevicornis. In this way 30.4 percent females were obtained in the first generation and 36.6 percent in the second. The low proportion of females is probably due to heavy mortality among them. The female larvae require more food than the male larvae and the pink bollworm is considerably smaller than the European corn borer. It is hoped that the sex ratio will improve as the parasite becomes more adapted to the pink bollworm as a host.

Boll weevil.--Because of mild weather in the Atlantic coast region last winter boll weevils hibernated successfully in larger numbers than farther west. However, hot, dry weather during June reduced the boll weevil population in the Eastern States so that less damage was caused in this region than in Texas, Oklahoma, Arkansas, Louisiana, and Mississippi. In nearly all of the States the infestations were "spotted," often being light on some farms and rather heavy on nearby farms. Taking conditions as a whole in all of the infested States, the boll weevil has not been as serious during 1933 as during 1932, but has caused more damage than during 1930 and 1931.

A combination of factors this year were favorable to the early fall destruction of the cotton stalks, one of the important methods of controlling the boll weevil. Cotton matured exceptionally early. The acreage was reduced by plowing under more than 10,000,000 acres during the summer, as part of the emergency cotton reduction campaign. There was an abundance of labor, and cotton was picked earlier than usual. A press release, "Early destruction of cotton stalks means fewer boll weevils in spring," was issued on October 10. A statement on the same subject was prepared in cooperation with the Radio Service of the Office of Information and was broadcast throughout the South. When reports were received from many sections that boll

weevils were breeding in volunteer cotton growing from the seeds and roots of much of the cotton that was plowed under in the emergency program last summer a press release and a radio broadcast were prepared urging the immediate destruction of the volunteer plants as a means of reducing the boll weevil population next season.

Host plants of the boll weevil.--R. C. Gaines reports that during August and September at Tallulah, La., 18 weevils developed in and emerged from althea (Hibiscus syriacus) buds--11 developing in buds in a caged plant and 7 in buds of plants growing in a cotton field. No weevils developed in the fruit of Hibiscus militaris, H. lasiocarpus, or okra.

The insectary and field studies of the field cricket, Gryllus assimilis pennsylvanicus, under way at Tallulah, La. for several years by J. W. Folsom, with the assistance of P. A. Woke and others, have been practically completed and the results are being written up for publication. One of the interesting discoveries in connection with these studies is the unusually large number of instars that this insect has. Of 131 adults reard from the egg--

14	individuals	had	9	nymphal	instars
102	"	"	10	"	"
13	"	"	11	"	"
2	"	"	12	"	"

INSECTS AFFECTING MAN AND ANIMALS

Mosquito control as a work relief project.--The Bureau of Entomology has been giving much attention to plans for the development throughout the country of extensive programs of pest-mosquito control as work-relief projects. As a part of this activity a conference was held in New York City on October 30. All of the Northeastern States from Maryland to Maine, inclusive, were represented by the State Entomologists and others actively directing anti-mosquito work, the State directors of emergency relief, or their representatives. The Washington office of the Federal Emergency Relief Administration was represented by Julius Stone, Jr., and the Bureau of Entomology by F. C. Bishopp. The following resolution was passed:

Resolved: That in the judgment of the official entomologists and of the officers of the Federal and State Unemployment Relief Administrations here assembled, mosquito control projects should be given serious consideration as a source of emergency unemployment relief work wherever these insects constitute a pest problem of sufficient magnitude.

Following the conference Dr. Bishopp reviewed some of the plans for extensive drainage work for mosquito control in New York and Delaware.

In line with this same idea of utilizing the unemployed in salt marsh mosquito control G. H. Bradley of the Orlando, Fla., laboratory, made a preliminary survey of the present situation in Mississippi and Alabama. Various local and State officials in those States were conferred with. The initiation of extensive drainage work appears to be feasible in several districts.

Stable fly a serious pest along the North Florida Gulf Coast.--W. V. King of the Orlando, Fla., laboratory, in company with L. G. Lenert, head of the Engineering Department of the Florida State Board of Health, made a trip during the latter part of October to investigate the reported occurrence of excessive numbers of the stable fly, Stomoxys calcitrans L., along the northern Florida gulf coast. Inquiries elicited the information that this fly, locally known as the "dog fly", becomes a serious pest each year in this area during the months of September and October. They are most troublesome to people along the beaches, and after their appearance all the bathing resorts are closed up and the beaches avoided. Fisherman are greatly tormented, as are also domestic animals, especially dogs and cattle, the latter having acquired the curious habit of wading out into the salt water and remaining there half submerged for hours. Dairymen reported losses in milk production of from 25 to 50 percent during the fly season. A mixture of fish oil and crude petroleum was found to be commonly used on the cattle as a fly repellent. At one of the dairies visited the cattle were kept during the daytime in a large stable, the interior of which was darkened as much as possible by hanging burlap over all the openings. The area of heaviest infestation appears to extend from the vicinity of Saint Marks on the east to the western boundary of the State, an air-line distance of nearly 200 miles. While conditions peculiar to this part of the coast must be responsible for such unusual abundance of the fly, no definite information as to their probable source could be obtained so late in the season.

Buffalo gnat status in Mississippi.--G. H. Bradley made a trip to the buffalo gnat areas in Mississippi during the latter part of October for the purpose of ascertaining whether or not any young larvae of Eusimulium pecuarum Riley had appeared in the rivers. Examinations were made in the Coldwater, Tallahatchie, and Yalobusha Rivers, all of which were at very low stage. A number of gnat larvae were collected. Only a few of these have been examined, none of which appear to be E. pecuarum.

Educational campaign against screw worms in Georgia.--With the cooperation of Wm. E. White, veterinarian of the Georgia Department of Agriculture, H. B. Raffensperger, of the Bureau of Animal Industry, and W. E. Dove, of the Savannah, Ga., laboratory, an educational campaign was conducted against screw worms for the benefit of farmers and stockmen of southern Georgia. In each of 32 counties, and in all but 3 counties of the Georgia infestation, these men were invited to address mass meetings of farmers regarding screw worm control. From 90 to 600 farmers attended the meetings held in county court houses. In one instance a judge recessed court to give an opportunity for the screw worm meeting. Following the meetings farmers pledged themselves to prompt disposal of carcasses, to dissemination of the information to their neighbors, and to the use of the recommendations of the Bureau of Entomology. In some instances range riders were employed by the county commissioners to enforce a Georgia statute requiring prompt disposal of carcasses of animals. Commercial benzol was obtained by dealers and county commissioners from a motor fuel manufacturer at a price of 35 cents per gallon f. o. b. Atlanta, Ga. Since most of the farmers in Georgia make and use a home-run pine tar on cuts and wounds of animals, it was recommended that they use 1 part of cottonseed oil to 2 parts of the home-run pine tar as a dressing for the wound and as a repellent for the flies. It is estimated that the actual losses due to deaths of animals and the cost of treating infested animals in Georgia amounted to $500,000. An average loss of $10 per farm on more than 60,000 farms exceeds such an estimate. It is believed that the campaign in Georgia prevented losses of more than a million dollars during the present year. Similar educational work was also carried on in northern Florida and during part of the outbreak extension entomologist P. D. Sanders assisted in the work.

"Considerable field survey work was accomplished during September and October," reports H. H. Stage, "along both sides of the Columbia River from the Cascade Mountains to Clatskanie, Oreg., for purposes of making estimates on brush clearing and necessary ditching in the mosquito control program centered at Portland. It has been found that brush clearing not only aids in gaining access to the large breeding grounds to be treated, but that the destruction of the matted willow growth has some direct influence on the reduction of the flood-water mosquitoes, Aedes aldrichi Dyar & Knab and A. vexans Meig. Employment for 800 men for 6 months was thus estimated and submitted to the Chamber of Commerce at Portland.

HOUSEHOLD AND STORED PRODUCT INSECTS

George B. Wagner, of the Kansas City, Mo., laboratory reports a 99.3 percent kill of insects with a dosage of about 8 ounces of liquid cyanide during a 17-hour exposure in an old-type brick flour mill. With a temperature of 90° F., dropping to 77° F., with a humidity of about 80 percent, and wind velocity of 5 miles per hour during the early part of the exposure, climatic conditions were quite favorable. The mill had been thoroughly cleaned and all mill stock taken out. The bolting cloths on the reels were being badly damaged by fabric pests and since the cloth on each reel costs about $40, one can understand the value of the fumigation if considered only from the standpoint of the reels alone.

Mr. Wagner also reports the successful treatment of 27,000 bushels of wheat with 300 pounds of calcium cyanide. This was 2-year-old wheat and was badly infested with the rice weevil, the lesser grain borer, and the sawtoothed grain beetle. The temperature of the wheat, which was between 95° and 100° F. before treatment, returned to normal after the fumigation.

Tom Brindley, of the Moscow, Idaho, laboratory, reports, among other things, that weighings of field peas, started when the seeds were ripe enough to thresh by hand, show that weevil development causes a loss in weight averaging between 18.3 and 22.2 percent. Samples of pea vines and threshed peas, from plots dusted during the past summer with calcium arsenate, showed a residue of 0.124 and 0.011 grain of As_2O_3 pound, respectively. According to Dr. Gildoe of the Veterinary Department of the University of Idaho, the residue on the vines would not be dangerous to cattle, but the residue on the threshed peas exceeds that permitted by the pure food laws. Mr. Magnuson, of the Department of Agricultural Chemistry of the University of Idaho, directed Mr. Brindley in making the above determinations of arsenic residue.

A. O. Larson and F. G. Hinman of the Corvallis, Oreg., laboratory, placed a series of hibernation cages in October at Union, Pendleton, Moro, Hood River, Hermiston, Redmond, Burns, Talent, Coquille, Corvallis, Astoria, Forest Grove, and Barlow. Last winter all pea weevils exposed to temperatures of -6° F., or lower, failed to survive the winter except where protected by snow or other covering. The weevils in the cages placed at the above mentioned places in Washington, Oregon, and Idaho are given varying degrees of protection with the hope that the results will be of value.

In his October report, Perez Simmons, of the Fresno Laboratory, gives the results of fumigations conducted by D. F. Barnes and C. K. Fisher, of freshly gathered figs with various fumigants. In all, 38 fumigations were conducted in especially devised fumigating boxes, each of 32 cubic feet capacity, and containing about 100 pounds of figs, arranged on screens. The temperature ranged between 82° F. and 118° F. and with minor exceptions the mortality was complete. A study of the insects killed indicated that about 98½ percent were Carpophilus, 1 percent Ephestia, and 1/2 to 1 percent miscellaneous.

On the nights of October 11, 12, 13, and 14, H. C. Donohoe operated a pale blue trap with electrocuting wires spaced 1/2 inch apart on centers, and a dark blue trap with wires 3/8-inch apart on centers. The traps were suspended between stacks of trays of figs in the drying yard at the Markarian ranch near Fresno. While the dark blue light was about twice as attractive as the pale blue light to the raisin moth and caught 1 2/3 as many noctuids, both traps were rather inefficient so far as the electrocuting feature was concerned.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

M. W. Blackman has made identification of Xyleborus affinis Eich., in black walnut log from East Africa (in cargo), intercepted at Baltimore, B.P.Q. Balto. #1870. Doctor Blackman has made an additional identification of Scolytus scolytus Fab., in curly elm log from France (in cargo), intercepted at New Orleans, B.P.Q. N.O. #6980.

A larval specimen of Dynastes tityus L., reported as found about 15 feet below the surface of the ground, has been identified by A. G. Boving. This was sent in from Brandywine, Maine, and is an unusual record, because 5 feet is considered to be more than the average depth. Doctor Boving also reports the identification of the larvae of Selatosomus (=Corymbites) aeneus L. in potatoes in ship stores, from Germany, intercepted at New York, B.P.Q. N.Y. #21200. Doctor Boving states that this insect is injurious to field crops in Europe. It is not known to occur in the United States.

Doctor Boving reports that W. Anderson, a student at the Maryland Agricultural College, has been working regularly under his supervision, starting in October, on the determination of coleopterous larvae. Mr. Anderson is working on personally collected material and is using standard reference works, principally Boving and Craighead's Synopsis of Coleopterous Larvae, for his studies.

Specimens of the scarabaeid found abundantly within the limits of Charleston, S. C., and which apparently has been introduced from South America, recently have been sent by E. A. Chapin, for determination, both to G. J. Arrow, of the British Museum, and to H. Kuntzen, of the Zoological Museum of the University of Berlin. The species is not recognized at either institution and is probably undescribed. It had been tentatively considered as Plectris poxa Germ. Doctor Kuntzen has compared specimens with the type of that species and reports that the two are closely related but distinct. Mr. Arrow considers the South Carolina specimens distinct but closely related to Philochlaenia maculicollis Arrow.

Among miscellaneous specimens of Coleoptera and Lepidoptera sent in for identification by George F. Knowlton, W. S. Fisher has found specimens of Prionus sp. not at present in the Museum collections, of Oberea montana Casey and of Neoclytus provoanus Casey, which previously were repesented in the collections only by the Casey types. Mr. Fisher has also found among specimens from Puerto Rico, obtained from Bureau of Plant Quarantine inspectors, the species Plectromerus distinctus Cameron, which was not previously present in the Museum collections, and a new species of Micrasta, a genus not previously reported from the Island of Puerto Rico. He has also recognized Tomarus discoideus Sharp, from Guatemala, intercepted at Baltimore, B.P.Q. Balto. #1833, another species not previously represented in the collections.

W. R. Sweaderer, a graduate student at the University of Pittsburgh, Pa., worked with F. H. Benjamin for several days recently, studying especially the methods in use here of preparing genitalia of Lepidoptera for study.

In September 1933 a large importation of senna (Cassia sp.) leaves, for medicinal purposes, from Sudan, Africa, was found by inspectors to be heavily infested with the caterpillars of a small moth and from these hundreds of moths were reared and captured. August Busck determined these as Tortilia n. sp. (family Heliodinidae) and submitted specimens to the English authority Edward Meyrick. In letter of October 24 Mr. Meyrick verified the identification and wrote that he had never seen the species. The genus Tortilia was erected by Chretien (Bul. Soc. Ent. France, p. 201, 1908) for a single species, T. flavella Chretien, reared from flowers of Acacia sp. at Biskra, Africa. The species found in this country is quite similar to the genotype in coloration and will be described by Mr. Busck as Tortilia viatrix (the traveler). It is the second known species of this genus.

C. T. Greene has made identification of Anastrepha obliqua Macq. from the Canal Zone on the basis of material of larvae, pupae, and adults collected in Quararibea asterolepsis at Barro. Colorado Island, and by James Zetek.

In August 1933 the Army Medical Corps decided to make a mosquito survey of the Civilian Conservation Corps camps throughout the country. Directions for collecting and packing insects were sent out to the health officers in each camp and the specimens collected each week were sent to the Army Medical Museum and then to this division for determination. Dr. Alan Stone, who personally examined all of the material sent in, reports that the first lot arrived August 31, and that by the end of October over 16,000 mosquitoes had been received, when all but a few of the southern camps had ceased collecting. Forty-three States, the exceptions being Delaware, Rhode Island, Idaho, Utah, and Nevada, sent in a total of 60 positively determined species, distributed among the genera as follows: Aedes 24, Culex 13, Psorophora and Anopheles 7 each, Theobaldia 4, Uranotaenia 2, and Mansonia, Megarhinus, and Orthopodomyia, 1 each. Dyar in 1928 recognized 114 species as occurring in the United States. Texas sent in the greatest number of species, 23, and Aedes vexans (Meig.) was the most widespread species, being collected in 29 States. Culex quinquefasciatus Say occurred most abundantly, which is not surprising since the southern camps were best represented and most of the collecting was done inside tents or buildings. Anopheles quadrimaculatus Say was the second most abundant, and the presence of malaria in many of the camps, as reported in the collecting data, is easily understandable. Aedes aegypti (L.), the yellow-fever mosquito, occurred infrequently and in small numbers. No unusual distributions were found, but the survey gave a rather good picture of the mosquito population of the country at the end of the season.

In a lot of material submitted for identification by Carlos A. Marelli, Director of the Zoological Garden of La Plata, Argentina, A. B. Gahan found specimens of four species of Chalcidoidea commonly found in North America but not recorded in the literature as occurring in South America, viz, Brachymeria ovata (Say), Aphycus luteolus Timberlake, Mormoniella vitripennis (Walk.), and Lariophagus distinguendus (Foerster). Mormoniella vitripennis is a common parasite of blowflies and is known to occur in Europe and Australia, as well as North America. Lariophagus distinguendus attacks certain stored-product insects and has frequently been taken by Bureau of Plant Quarantine inspectors in ship stores from vessels from various parts of the world, but this seems to be the first instance of its having been actually collected in South America. Brachymeria ovata is commonly associated with various moths, such as the tussock moth, in this country. Aphycus luteolus is a parasite of Coccus hesperidum and has previously been known only from California.

As result of extended study, A. B. Gahan has reached the conclusion that Hunterellus hookeri How. and Ixodiphagus caucurtei Du Buysson are identical, the former name having priority.

Very recently, L. D. Anderson, Assistant Entomologist at the Virginia Truck Experiment Station, sent for determination specimens that were placed by H. G. Barber as Corizus sidae Fab., with the statement that they were very abundant on althea, or Rose of Sharon, on the station grounds. That this heteropteron shows a preference for plants of the family Malvaceae has long been known, but what is of particular interest is the occurrence of this species in such large numbers so far north of its usual range. It has a very wide distribution from the Argentine Republic on the south through all of the Neotropical regions northward into the Southern States. On the Pacific coast it occurs in southern California, in the Central Plains Region as far north as Douglas and Riley Counties, Kans., and in the East from Florida to South Carolina. Its food plants are chiefly in the family Malvaceae and include Abutilon sp. (?), Sphaeralcea angustifolia, okra, cotton, Hibiscus incanus, H. lasiocarpus, and Callirhoe involucrata. In the closely related family Sterculiaceae the species has been collected on Waltheria americana. Specimens are also at hand that were collected on Amaranthus in Texas.

Gonzalo Merino of the Philippine Department of Agriculture, at present engaged on graduate work at Ohio State University, spent the period from October 19 to November 4 at the National Museum, working on the classification of Philippine Cicadellidae and particularly on the C. F. Baker collection from those islands.

INSECT PEST SURVEY AND PUBLIC RELATIONS

During September and October the literature was reviewed for Insect Pest Survey records, including distribution, food plants, parasites, relative importance, and brief life history of 23 species of insects, and the notes were added to the permanent record files of the survey. This brings the number of insects upon which reviews have been made up to 168. The survey file now contains notes on 18,000 species of North American insects of more or less economic importance; and also contains notes on 10,000 species which are pests in other countries but have not been discovered in this country.

A program of 100 entomological subjects for radio broadcasting during 1934 was completed during the month.

In September, M. P. Jones, subject matter specialist for the Northern States, made a fall trip in the northeastern part of the United States, following up work projected earlier in the season, and discussing 4-H Club work. While on the trip he took charge of the Department's exhibit at The Rochester Exposition. The Bureau's unit on peach borer control attracted much favorable comment. He left Washington the latter part of October to assist the State extension forces in organizing a campaign for chinch bug control in the Central States.

PHYSIOLOGY AND TOXICOLOGY OF INSECTS

M. C. Swingle has gone to Sanford, Fla., where he will spend about 6 months in a study of the toxicology of various nicotine preparations. He will be assisted by J. F. Cooper, who was formerly stationed at Cornelia, Ga., in the Division of Fruit and Shade Tree Insects. This is one of the four projects being started by the Bureau under special grants from the Tobacco Section of the A.A.A.

J. W. Bulger is now receiving eggs of Florida mosquitoes from W. V. King, of Orlando, Fla. Dr. Bulger will use mosquito larvae during the winter to study the value of various antioxidants and dyes in retarding the photochemical decomposition of rotenone.

F. L. Campbell and W. N. Sullivan are making a survey of the insecticidal value of kerosene extracts of various species and samples of Cracca native to this country. Only one of 9 samples so far studied has shown any promise. This was a sample of roots of Cracca latidens from Florida. It was not so effective as a sample of derris.

EXCHANGE OF USEFUL INSECTS

G. J. Haeussler reports that, from a total of 1,340 cocoons of Macrocentrus ancylivorus forwarded to Japan in June and delivered to Dr. T. Ishii of the Imperial Agricultural Experiment Station at Nishigahara, an emergence of 64.34 percent was obtained. The greater portion ofthese were liberated in Schizuoka Prefecture where the oriental fruit moth infestation is consistently heavy. A portion of the material was retained in the laboratory for insectary rearing and for further distribution to other infested areas.

Mr. Haeussler reports collections during August of twigs infested with the oriental fruit moth, totaling 42,089. The greater part of these were obtained from Okayama-ken and Nagano-ken, Japan. While the percentage of parasitization is consistently higher in Chosen (Korea), yet the number of species represented in the Japanese collections is much larger. Considerable numbers of Dioctes molestae emerged from the Chosen material, and as these were not required for shipment to the United States they were forwarded to Doctor Ishii for liberations in Tokyo and Kanagawa prefectures. The earlier surveys have shown that this valuable parasite does not occur in that section.

BEE CULTURE

The subject of laboratory quarters for various offices of this division has received considerable attention during the past month. Warren Whitcomb, Jr., in charge of the Southern States bee culture field laboratory, Baton Rouge, La., writes that a conference of Federal men and members of the experiment station was held in the office of the Director of the experiment station to discuss space requirements in a proposed new building. If funds become available it is planned to erect a building approximately 60 ft. by 160 ft. to house all the Federal and experiment station men. A. P. Sturtevant, in charge of the U. S. Intermountain States bee culture field laboratory, Laramie, Wyo., reports that the University of Wyoming turned over for the use of his laboratory enlarged and greatly improved quarters. With curtailments of various kinds the order of the day, improvements of this sort are greatly appreciated. The third office to be affected is the laboratory at Somerset, Md. The Public Works Administration has allotted funds for a laboratory building at the Beltsville farm.

The old bacteriological doctrine of fixity of form in bacteria is gradually giving way before constantly increasing evidence that bacteria are capable of morphological, cultural, and biological transformation. An example of pleomorphism is found in Bacillus alvei, an organism constantly encountered in European foulbrood of bees, of which the etiology is an unsettled problem. It is commonly supposed that this disease is caused by an unculturable species, "Bacillus pluton," and that Bacillus alvei, "Bacterium eurydice," and "Streptococcus apis" are distinct species commonly associated with the disease as secondary invaders. Investigations conducted during the past 4 years indicate that the bacterial forms commonly associated with European foulbrood, which have been considered distinct bacterial species, may be only variants or mutants of Bacillus alvei. C. E. Burnside of this office has devised cultural methods by which sporogenic cultures of Bacillus alvei can be transformed into asporogenic cultures. When cultured on the same nutrient media on which Bacillus alvei ordinarily sporulates promptly the transformed cultures formed no spores at all.

A new film strip entitled "Diagnosis of Bee Diseases in the Apiary," accompanied by appropriate lecture notes, has just been made available by the Extension Service. The film strip contains 58 illustrations showing the symptoms of the various bee diseases, and is designed to help in making correct diagnosis of bee diseases in the apiary.

Bilo Lisboa, Director of the Escola Superior De Agricultura e Veterinaria, Vicosa, State of Minas Geraes, Brazil, accompanied by A. S. Mueller, a member of his staff, formerly of Cornell University, recently visited the Somerset laboratory. The gentlemen are making an extensive tour of the United States, visiting a number of the colleges and experiment stations. They plan to obtain a large quantity of seed and propagating stock to take back to Brazil. Through arrangements made with the laboratory they will include a shipment of 24 Italian queens.

G. E. Marvin, Somerset, Md., has obtained some interesting results relating to the weight per gallon of honey. As a matter of convenience, honey was divided according to the weight per gallon into four classes as follows: (1) Those weighing above 11.88 pounds per gallon; (2) those weighing from 11.80 to 11.88 pounds per gallon; (3) those weighing from 11.75 to 11.80 pounds per gallon; and (4) those weighing less than 11.75 pounds per gallon. Out of 40 samples, 32 1/2 percent fell in each of the first two classes and 17 1/2 percent fell in each of the last two classes, the last class weighing less than the minimum U. S. Grade requirements. The honeys used in these tests came from widely scattered points and represented quite a range of floral types. With the rather limited number of samples worked on in these tests, it was not possible to come to any conclusions relative to the relationship between floral source and weight per gallon.